

Examiners' report

AS LEVEL

COMPUTER SCIENCE

**OCR Level 3 Advanced Subsidiary GCE
in Computer Science**

H046

For first teaching in 2015

H046/01 Summer 2025 series

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Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate responses is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from [Teach Cambridge](#).

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Paper 1 series overview

H046/01 (Computing Principles) is one of two examined components for the GCE AS Level Computer Science. This component focuses on:

- the characteristics of contemporary processors, input, output, and storage devices
- software and software development
- programming
- exchanging data
- data types, data structures, and algorithms
- legal, moral, ethical, and cultural issues.

To do well on this paper, candidates needed to be able to demonstrate and apply knowledge across all the topics listed above in different contexts.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• discussed the functions of an operating system in the context of the organisation for Question 2 • correctly wrote a loop to count items in an array for Question 3 (b) • correctly wrote a function to add together the items in an array and return the average for Question 6 (b) (ii) • correctly completed the Karnaugh map and the simplified expression for Question 8 (a).	• did not discuss the functions of an operating system within the context of the organisation for Question 2 in sufficient detail • did not discuss the moral, ethical, legal and environmental drawbacks of a delivery system for Question 4 in sufficient detail • did not identify two data capture methods within the context of the question for Question 3 (a).

Question 1 (a)

- 1 The table shows the steps of the **Fetch** stage only of the Fetch-Decode-Execute cycle. The names of the registers are referred to as A, B, C and D.

1	The contents of the Register A are copied into the Register B .
2a	RAM is read at the location specified by the Register B and its contents are copied into the Register C .
2b	Register A is incremented by 1.
3	The contents of the Register C are copied into the Register D .

- (a) State the name of each register in the table.

Register A	
Register B	
Register C	
Register D	

[4]

This question was generally answered well with most candidates achieving full marks. Some candidates did not gain 2 marks as they had incorrectly identified Register B as the MDR/Memory Data Register and then identified Register C as the MAR/Memory Address Register.

Question 1 (b) (i)

- (b) Describe how the performance of the Fetch-Decode-Execute cycle changes when increasing:

- (i) The number of cores

.....
 [1]

Most candidates answered this question correctly, although some did not write the response in the context of the FDE cycle and therefore did not achieve the mark.

Question 1 (b) (ii)

(ii) The clock speed

.....
..... [1]

Most candidates answered this question correctly, although were too vague in their response and did not mention the change to the FDE cycles per second/per unit time. This detail was required to be given the mark.

Question 2*

2* OCR Accountants is a firm of 30 employees. Each employee handles financial matters for many local businesses.

The organisation runs a single large server which hosts their email, website and files about businesses they work with.

Discuss the different functions of an operating system and why they are essential to the management of this single server.

You should refer to the following in your answer:

- the different functions of an operating system
- how these functions can be used to manage the OCR Accountants' server and why they are essential?

[9]

Candidates were assessed on the quality of their extended response in this question. Most candidates did not answer the question in the context of the organisation and discussed functions which were not relevant to this scenario.

Assessment for learning



Extended response questions with the command word 'discuss' require candidates to read the question and provide comments that relate to the scenario. Opportunities to practise these questions will support candidates to do better on these style questions.

Question 3 (a)

- 3** Ben works for a company that conducts national public surveys. The surveys are given to 10 people at a time and each question has **three** different options to choose from: A, B or C. For each question people select **one** option only.

- (a)** Identify **two** data methods that Ben could use to capture the data and identify a benefit of each.

METHOD 1

Method

.....

Benefit

.....

METHOD 2

Method

.....

Benefit

.....

[4]

This question was generally answered well although some candidates identified data input methods rather than data capture methods. This did not answer the question and resulted in no marks being given.

Question 3 (b)

- (b) When the data is collated, the answers for each question are stored in separate 2-dimensional arrays. Question 1 is stored in an array called `resultsQ1`.

Each person is stored on a separate row. Each row contains three Boolean values. `True` is used if that option was selected or `False` if that option was not selected.

For example, the results for `resultsQ1` are:

Option A	Option B	Option C
False	False	True
False	True	False
True	False	False
True	False	False
False	False	True
False	True	False
False	False	True
False	False	True
False	False	True
False	True	False

In the example shown, the first person selected Option C for question one, the second person selected option B, the third person selected option A, and so on.

Write pseudocode or program code that will:

- count and output which option A, B or C was selected the most in the array `resultsQ1`
- output how many people selected the most popular option.

You may assume that no two options have the same number of votes.

.....

.....

.....

.....

.....

..... [7]

Most candidates were given some of the available marks for this question. Most candidates wrote a suitable loop to iterate through the array and correctly determined the most selected option, although few candidates achieved full marks by looping through the rows and columns in the table.

Exemplar 1

In the example shown, the first person selected Option C for question one, the second person selected option B, the third person selected option A, and so on. ^{① count ② A ③ B ④ C}
^{if ... true} ^{② for loop} ^{if ... true}
 Write pseudocode or program code that will: ^{array [10, 2]} ^{array}

- count and output which option A, B or C was selected the most in the array resultsQ1
- output how many people selected the most popular option.

You may assume that no two options have the same number of votes.

```

function popular-most-voted(resultsQ1)
  for each i in
  A = 0
  B = 0
  C = 0

  for i in range (0, len(array) resultsQ1)-1)
    if resultsQ1[i, 0] == True THEN
      A = A + 1
    elseif resultsQ1[i, 1] == True THEN
      B = B + 1
    else:
      C = C + 1
    next i
  end if
end for

if A > B and A > C THEN
  print("A was selected the most:", A, "times")
elseif B > A and B > C THEN
  print("B was selected the most:", B, "times")
else
  print("C was selected the most:", C, "times")
endif
endfunction
  
```

[7]

Exemplar 1 was given full marks. The candidate has initialised variables A, B and C and has incremented each of these variables using a for loop. Each of the rows and columns of the array have been checked and the totals of each variable have then been compared to establish the most selected option.

Question 4*

4* A major online retailer is looking to improve how they deliver their products. They currently use delivery companies to deliver their products to customers.

They intend to use drones to deliver any products that weigh below 5 kilograms. Heavier products will be delivered using electric self-driving vehicles.

Discuss the drawbacks of implementing this system.

You should refer to the following in your answer:

- moral and ethical issues
- legal considerations
- environmental considerations.

[9]

Most candidates were given a mark in either band one or two for this question. Most candidates did not write drawbacks in the context of the question and therefore did not gain marks. Many candidates also discussed advantages that the drones could offer which doesn't answer the question and therefore did not gain marks.

Exemplar 2

[9]

Use of drones and driverless vehicles means that many ~~let~~ jobs involved in the delivery of items will be lost. This creates an ethical issue as it means that people will not only lose an income, but the company's reputation may be damaged, leading to lack of usage of the company and loss in profits. People also may be unsettled by the lack of human interaction in the process, as machines showing up to their door on their own may be perceived as threatening. Having drones flying around in the air may also be annoying.

Legal issues surrounding the idea include ~~to~~ data protection concerns. The Data Protection Act requires companies to store any personal information securely. If the vehicles will store the address of the recipient, meaning that they must be well protected from hackers as if someone hacked into the vehicle they could have access to personal information. The vehicles would also have to delete the addresses of their recipients immediately after delivery ~~or~~ they would be storing the data longer than necessary which violates the Data Protection Act.

Furthermore, the vehicles must be prevented from accessing any networks as they may end up breaking the laws is the Computer Misuse Act by connecting to a network or system without authorisation.

The idea ~~is~~ also has many environmental implications. Firstly, the ~~z~~ machines ~~z~~ will have high electricity consumption due ~~it~~ to the constant charging required for their travel and internal processing. ~~If~~ As most electricity is generated from non-renewable, polluting sources, the high energy consumption is very bad for the environment. Disposal of old or broken devices also poses an issue. As the machines contain computers ~~r~~ and circuits, they will invariably contain highly toxic materials. This means that if the machines are simply put in landfill then the environment will be damaged. Drone flight may also disrupt birds and cause them ~~unae~~ stress, negatively affecting them.

In conclusion, the drone and vehicle system has many drawbacks including moral, legal and environmental issues. These range from unsettling driverless cars appearing at someone's door to data protection laws and even energy consumption issues.

Exemplar 2 was given 5 marks. The candidate has discussed legal and environmental drawbacks, although there are limited points relating to moral and ethical issues. Some points made are not fully developed and have limited application. This response was therefore given a mark within the mid-level band.

Question 5 (a) and (b)

5

(a) Convert the denary number 183 into a hexadecimal number.

.....
.....
.....
..... [1]

(b) Calculate the binary addition of these two 8-bit (unsigned) binary numbers.

Show your working.

$$\begin{array}{r} 01010011 \\ +11101011 \\ \hline \end{array}$$

[2]

Most candidates answered both of these questions correctly.

Question 5 (c)

(c) Calculate the binary subtraction of these two 8-bit (unsigned) binary numbers.

Show your working.

$$\begin{array}{r} 11011001 \\ -00100101 \\ \hline \end{array}$$

[2]

Most candidates answered this question correctly although some candidates converted the binary to denary values first and were therefore given no marks.

Assessment for learning



Binary calculations of this type must show working that relates to a suitable method. Candidates should be reminded that converting binary to denary to complete calculations is not a suitable method.

Question 5 (d)

(d) Tick (✓) **one** box for each piece of data to show if it is an example of a **String**, **Float** or **Character** data type.

	String	Float	Character
3.14			
"j"			
"Hello World"			

[3]

Most candidates answered this question correctly.

Question 6 (a)

6 Beth records how many steps she has completed over a seven-day period.

She stores the total number of steps for each day in a text file. For example:

"9000" , "13680" , "11254" , "8258" , "12326" , "9244" , "7542"

Beth would like a program that will take the values from the text file and then calculate the average number of steps per day.

(a) Beth has realised that she will need to convert the data from the text file to another data type.

State the data type the values will need to be converted to and state the reason why.

Data type

.....

Reason

.....

[2]

Most candidates answered this question correctly and stated a numeric data type for the first part of the question. Some candidates gave reasons why a string data type would not be suitable, rather than stating why a numeric data type would be suitable. This resulted in the second mark not being given.

Question 6 (b) (i)

- (b) The values from the text file are copied into a 1d-array called `steps` when the program starts.
For example:

9,000	13,680	11,254	8,258	12,326	9,244	7,542
-------	--------	--------	-------	--------	-------	-------

Beth passes the array `steps` into a function called `findAverage` which will return the average number of steps.

- (i) An alternative data structure Beth could have used is a list.

Describe **two** differences between a list and an array.

1

.....

.....

.....

2

.....

.....

.....

[4]

Many candidates achieved full marks for this question although some confused the features of lists with the features of arrays (and vice versa) and therefore did not gain marks.

Question 6 (b) (ii)

- (ii) Write the function `findAverage` that will accept the array `steps` as a parameter and then return the average number of steps.

You should write your answer using pseudocode or program code.

.....

.....

.....

.....

.....

..... [5]

This question was generally answered well with many candidates achieving full marks. Some candidates lost a mark for missing the parameter (`steps`) and some missed another mark for not returning the answer.

Exemplar 3

```
function findAverage (steps)
    total = 0
    for i = 0 to steps.length() - 1
        total = total + steps[i]
    next i
    average = total / steps.length()
    return average
endfunction
```

Exemplar 3 was given full marks. The candidate has named the function correctly with 'steps' as a parameter. The average has been calculated correctly, and the function correctly returns the calculated value.

Question 6 (c)

(c) Beth needs to translate her code using a compiler or an interpreter.

Describe **one** benefit to Beth of using a compiler instead of an interpreter.

.....

.....

.....

..... [2]

Most candidates answered this question correctly, although some did not achieve the second mark for explaining how the compiler would benefit Beth in particular.

Question 7 (a) and (b)

7 A common method for representing characters is the Unicode character set. This was developed to improve the ASCII character set.

(a) Explain **one** benefit of using Unicode instead of ASCII.

.....

.....

.....

..... [2]

(b) Explain **one** drawback of using Unicode instead of ASCII.

.....

.....

.....

..... [2]

Most candidates answered these questions correctly.

Question 8 (a)

- 8 Eve has designed a logic circuit. The expression she has created for the logic circuit is:

$$Q = (\neg C \wedge D) \vee (\neg C \wedge \neg D) \vee (A \wedge C \wedge \neg B)$$

- (a) Complete the Karnaugh map for this expression and state the simplified expression.

You should draw groups around the cells you are using to simply this expression.

Show your working.

		AB			
		00	01	11	10
CD	00				
	01				
	11				
	10				

Simplified expression:

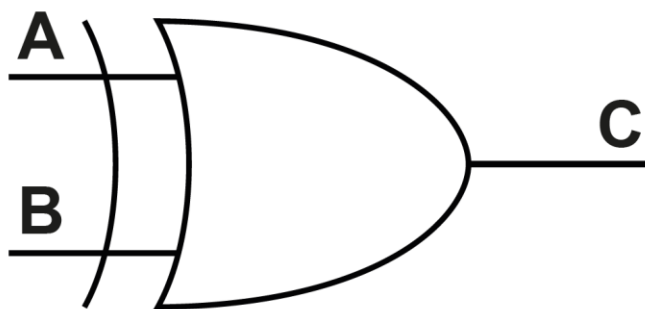
.....

..... **[4]**

Most candidates answered this question correctly and were given all 4 marks. Some candidates completed the Karnaugh map correctly but were unable to correctly write the simplified expression therefore not gaining 1 mark.

Question 8 (b) (i), (ii) and 9 (a)

(b) A logic gate is shown here:



(i) State the name of this logic gate.

..... [1]

(ii) Complete the truth table for this logic gate.

A	B	C
0	0	
0	1	
1	0	
1	1	

[1]

9

(a) When computers transmit data over a network they use protocols.

Explain the importance of using protocols when transmitting data.

.....

.....

.....

..... [2]

Most candidates answered these three questions correctly.

Question 9 (b)

(b) The TCP/IP stack allows communication over large distances such as the internet.

Describe the purpose of the **transport** layer in the TCP/IP stack.

.....

.....

.....

..... [2]

Most candidates answered this question correctly, although some did not use the word 'packets' when describing data being split and therefore did not gain marks.

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